Transcripts of G2010-051_Electric_Lunar_Craters_ipod_lg

[music fades up] [narrator] Polar lunar craters are of interest for future space exploration because potential resources, including water ice, have been found to exist there. However intriguing recent calculation from NASA's Lunar Science Institute team indicate a possible new obstacle to reaching those resources, and the implications are a bit shocking. [Bill Farrell] Well in a nutshell, what we're finding, is that the polar craters are very unusual electrical environments. And in particular there can be large surface charging at the bottom of these polar craters. [narrator] Because the Moon is only slightly tilted to the Sun, landscapes at the lunar poles have several unique characteristics. With sunlight coming in sideways, tall polar peaks reach out and receive almost constant sunlight, while deep polar craters hide surfaces that may not have seen light for millions of years. The orientation of these dark craters to the Sun may allow them to trap water ice but it may also be charging them to hundreds of volts. [Farrell] Well the solar wind is actually a relatively tenuous gas. that's emitted from the Sun, but it's not a neutral gas, like the gas in this room, it's actuall a gas that's really, for the most part, free ions and free electrons, it's really two components. And so you have this electrical gas if you will. And then as it passes by the Moon, the electrons behave slightly differently than the ions, of course the electrons are very low mass, the ions are more mass, again we don't think of an ion as being something real heavy, but compared to these little, flimsy electrons they really are. So as you pass by, for example, a polar crater the electrons will actually fill into the crater, ahead of the ions. Now as it turns out, as it does that, you create an electric field, it's called an ambipolar electric field, and that electric field then drives in the ions. [narrator] So while it is already known that human or robotic explorers searching within these dark craters would face temperatures that plunge below minus 400 degrees farenheit, this new computer model suggests they may have to contend with a dangerous electrical environment as well. Static discharge could short out sensitive electronics, while the static cling of sticky and extremely abrasive lunar dust could wear out spacesuits and other equipment. Astronauts and instruments within these craters would need to be electrically grounded to avoid such hazards. [Farrell] Well that is actually the crux of the whole problem, what is the electrical ground on the Moon? You actually have a surface on the Moon that has the conductivity, it's almost like candle wax, you know, you're not going to get a charge out of the ground. So you're really grounded to the plasma. And when you're out in the solar wind, you know, on the surface of the Moon, not in these craters and not in these mountains, okay you're grounded. But when you start heading into these craters, you've now lost touch with your electrical ground, so that means you take a step and you might have to wait a hundred seconds before that charge that you just accumulated disapates away. That's a long time to be stepping around. So you really do have to worry about human systems going into these craters. [narrator] The next steps for the Lunar Science Institute team include more complex computer models. There are still many questions to answer about where the Moon's key polar resources lie, how they got there, and whether or not future explorers will be able to reach them. To learn more about NASA news and research visit www.nasa.gov